Investigating fuel poverty in the transport sector: toward a composite indicator of vulnerability

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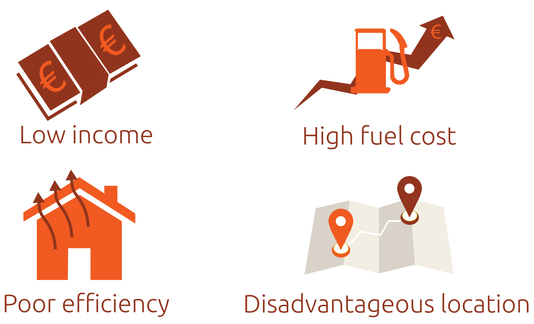
① Fuel poverty is **also about transport**: households that **depend heavily on car use** for their daily trips are likely to **face difficulties** if fuel prices keep on rising.

Fuel poverty is when a houshold is **unable to afford** an **adequate amount** of energy services to **satisfy its basic needs**.

It is at the intersection of four **key drivers**:



What matters for evaluating fuel poverty in the transport sector is to:

- recognise **diverse mobility needs**
- detect **restricting behaviours**
- evaluate households' **capacity to adapt**

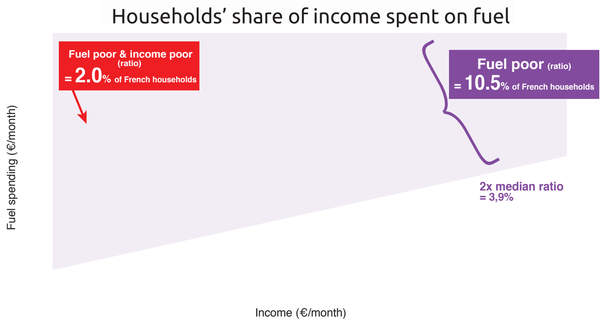
This **variety of situations** rouses debates about which indicator(s) should be used to evaluate fuel poverty. Yet the **choice of indicator** leads to **different policy choices**.

Our work is illustrated with a French case study.

- Data from the National Transport Survey (Enquête Nationale Transports et Déplacements)
- Conducted by INSEE every 10-15 years, last available from 2008
- Interviewed a sample of 20 200 French households
- Offers a detailed description of travel behaviors (compared to BDF) at the national level (compared to EMD)
- Focus on places to work and study.

② We can **transpose domestic fuel poverty indicators** to the transport sector, but transposed indicators are **not satisfactory**.

A ratio indicator is the **official way of counting fuel poor** in France for the domestic sector today. It is advantageous for its simplicity. Applied to the transport sector, we find **10.5% of French households are fuel poor**, meaning they spend more than 3.9% of their income on buying fuel. Restricting the analysis to the most deprived households, we find **2.0% are both fuel poor and income poor.**



Identify:
Disproportionate share of income spent on fuel

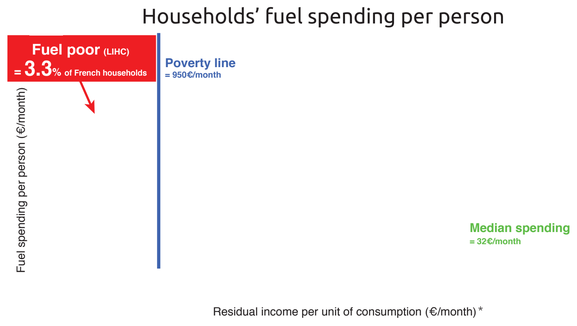
Equation:
$\frac{\text{Fuel spending}}{\text{Income}}$

Threshold:
2x median

	Number of households	% of population
RATIO	2.6 millions	10,5 %
RATIO$_{IP}$	0.5 million	2.0 %

The LIHC* indicator is the official way of counting fuel poor in the UK for the domestic sector. It has the advantage to include households whose **standard of living is lowered because of their fuel spending**. Applied to the transport sector, we find **3.3% of French households are fuel poor**, meaning each person spends more than 32€/month on buying fuel and live below the poverty line.

*Low Income High Cost



Identify:
High fuel spending | Low residual income

Equation:
$\frac{\text{Fuel spending}}{\text{Number of active individuals}}$ | $\frac{\text{Income - Fuel spending}}{\text{Number of consumption units}}$

Threshold:
Median | 60% median

	Number of households	% of population
LIHC	840 000	3,3%

Limits:

These indicators bring a normative approach to mobility:

But how to allow for diverse mobility needs and practices when considering what it is 'reasonable' for a given household to spend on fuel?

Restriction and capacity to adapt are not evaluated:

Don't we miss essential features?

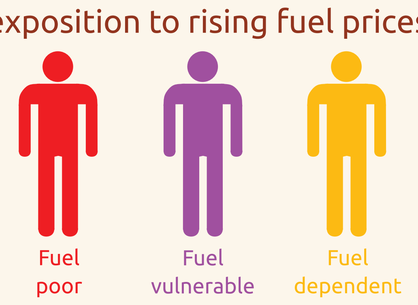
③ An approach that targets **factors of vulnerabilities** is called for, with a **new indicator** measuring the **different dimensions** of the phenomenon.

We propose a composite indicator of three dimensions…

Dimensions	Factors
Financial resources	Income poor
	Low income
Fuel consumption	High spending
	Restriction
Conditions of mobility	Poor spatial matching
	No alternative
	Low vehicle performance or No vehicle

+

…identifying three levels of exposition to rising fuel prices.



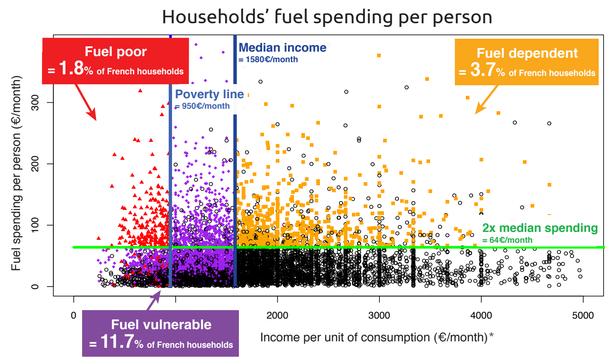
How?

Combinations of factors (gather at least)							
Financial resources		Fuel consumption		Conditions of mobility			
Income poor	Low income	High spending	Restriction	Poor spatial matching	No alternative	Low vehicle performance or No vehicle	
X		X					Fuel poor
X			X				
X				X	X		Fuel vulnerable
X					X	X	
X				X		X	
		X		X	X		Fuel dependent

Level of exposition

By cumulating the factors in which a household is affected, our composite indicator identifies the population most exposed to a rise in fuel prices. It follows the dual cut-off method developed by Alkire and Foster. It employs two types of threshold: **one threshold is defined per factor** to determine whether that factor applies to the household, and **the other threshold is defined across factors**.

Our composite indicator identifies **1.8% of French households are fuel poor**: they are income poor with a high fuel spending (>64€/month/person) or restriction. We find a further **11.7% are fuel vulnerable:** they show limited capacity to adapt from a change in their current situation. (new-born baby, change workplace, higher housing costs, etc.). We find a further **3.7% are fuel dependent**: with high committed spending such as loan reimbursement or payment of children studies, they could be negatively affected in their daily budget.



Identify:
Disadvantageous combinations of factors

Measure:
Financial resource
Energy consumption
Conditions of mobility

Threshold:
Per factor / Across factors

Number of households	% of population
0.5 millions	1,8 %
2.9 millions	11.7 %
0.9 million	3.7 %

* To compare the standards of living of households of different sizes, we adjust income by the consumption unit (CU) using the OECD equivalence scale: 1 CU for the first adult in the household, 0.5 CU for other adults, 0.3 CU for children.

A **composite indicator of vulnerability** highlights the **conditions of mobility** and reveals households' **exposition to rising fuel prices.**

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